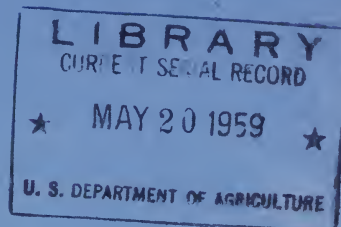


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Reserve
1096
R31 Fam

Here, on Mt. Rose, Nevada, Dr. J. E. Church made
the first western snow survey 50 years ago.



FEDERAL - STATE - PRIVATE COOPERATIVE
SNOW SURVEY and WATER SUPPLY FORECASTS
for
COLORADO, RIO GRANDE, PLATTE
and ARKANSAS DRAINAGE BASINS

UNITED STATES DEPARTMENT of AGRICULTURE--SOIL CONSERVATION SERVICE.
and
COLORADO AGRICULTURAL EXPERIMENT STATION,
STATE ENGINEER of COLORADO
and STATE ENGINEER of NEW MEXICO

Data included in this report were obtained by the agencies named above
in cooperation with the U.S. Forest Service, National Park Service,
Bureau of Reclamation, State Engineers of Utah and Wyoming; and other
Federal, State and private organizations.

||||||| AS OF |||||
MAY 1, 1959

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY AND WATER SUPPLY FORECAST REPORTS:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Fortunately, most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from fore-knowledge of the runoff.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, about 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1300 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

By relating snow survey measurements taken over a period of years to spring-summer runoff during the same period, relationships have been developed which make it possible to forecast seasonal runoff several months in advance of occurrence. In order to make a forecast, once a forecast relationship has been developed, the maximum snow water content at previously selected key snow courses is usually entered in the forecast relationship. More accurate forecasts are often obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast relationships.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	COOPERATING WITH	LOCATION
RIVER BASINS			
COLORADO, RIO GRANDE AND ARKANSAS	MONTHLY (FEB.-MAY)	COLO. EXP. STATION COLO. STATE ENGINEER NEW MEXICO STATE ENGINEER	FT. COLLINS, COLO.
COLUMBIA <i>Includes Alaska</i>	MONTHLY (JAN.-MAY)	IDAHO STATE ENGINEER	BOISE, IDAHO
UPPER MISSOURI	MONTHLY (FEB.-MAY)	MONT.AGR.EXP.STATION	BOZEMAN, MONTANA
WEST-WIDE	(OCT. 1. APR. 1 AND MAY 1)	COOPERATORS	PORTLAND, OREGON
STATES			
ARIZONA	SEMI-MONTHLY (JAN. 15-APR.1)	SALT R. VALLEY WATER USERS ASSOCIATION	PHOENIX, ARIZONA
NEVADA	MONTHLY (FEB.-APR.)	NEVADA STATE ENGINEER	RENO, NEVADA
OREGON	MONTHLY (JAN.-MAY)	ORE.AGR.EXP.STATION	PORTLAND, OREGON
UTAH	MONTHLY (JAN.-MAY)	UTAH STATE ENGINEER UTAH AGR.EXP.STATION	SALT LAKE CITY, UTAH
WASHINGTON	MONTHLY (FEB.-MAY)	WASH. STATE DEPT. OF CONSERVATION	SPOKANE, WASHINGTON
WYOMING	MONTHLY (FEB.-JUNE)	WYOMING STATE ENGINEER	CASPER, WYOMING

Copies of the various reports may be secured from: Head, Water Supply Forecasting Section
Soil Conservation Service
209 S.W. 5th Avenue, Portland 4, Oregon

PUBLISHED BY OTHER AGENCIES

OTHER SNOW SURVEY REPORTS

BRITISH COLUMBIA	MONTHLY (FEB.-JUNE)	COMPTROLLER, WATER RIGHTS BR., DEPT. OF LANDS AND FORESTS, PARLIAMENT BLDGS, VICTORIA, B.C.
CALIFORNIA	MONTHLY (FEB.-MAY)	CALIFORNIA DEPARTMENT OF WATER RESOURCES, SACRAMENTO, CALIFORNIA

**FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND WATER SUPPLY FORECASTS**

for

**COLORADO RIVER, PLATTE RIVER
ARKANSAS RIVER AND RIO GRANDE
DRAINAGE BASINS**

Issued

May 10, 1959

Report Prepared By
Homer J. Stockwell, Snow Survey Supervisor
Fort Collins, Colorado
Jack N. Washichek, Assistant Snow Survey Supervisor
Fort Collins, Colorado

United States Department of Agriculture
Soil Conservation Service
and
Colorado Agricultural Experiment Station
Fort Collins, Colorado
and
State Engineer of Colorado
Denver, Colorado
and
State Engineer of New Mexico
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State Engineer
State of Colorado

Sherman S. Wheeler, Director
Colorado Agricultural
Experiment Station

S. E. Reynolds
State Engineer
State of New Mexico

General Series Paper No. 704
Colorado Agricultural Experiment Station

Snow Survey measurements in Wyoming, Utah, and Arizona are supplied by Snow Survey Supervisors, Soil Conservation Service, in those states.

WATER SUPPLY OUTLOOK
COLORADO, RIO GRANDE, PLATTE AND ARKANSAS
DRAINAGE BASINS

MAY 1, 1959

WATER SUPPLY OUTLOOK AS OF MAY 1 IS AVERAGE OR BETTER FOR THE ARKANSAS AND PLATTE DRAINAGES IN EASTERN COLORADO AND WYOMING. STREAM FLOW FOR 1959 IS EXPECTED TO BE SLIGHTLY LESS THAN AVERAGE FOR THE YAMPA, WHITE AND UPPER COLORADO RIVERS ON THE WESTERN SLOPE AND ABOUT THREE-QUARTERS OF AVERAGE ON THE GUNNISON. SNOWFALL ON THE RIO GRANDE, SAN JUAN AND DOLORES WATERSHEDS WAS EXTREMELY DEFICIENT DURING MARCH. AN ALREADY POOR WATER SUPPLY OUTLOOK FOR THESE STREAMS IN COLORADO AND NEW MEXICO DECLINED FURTHER DURING THE PAST MONTH. INFLOW TO ELEPHANT BUTTE WILL BE NEAR MINIMUM OR RECORD. STORAGE WILL PROVIDE A FAIR BUT INADEQUATE SURFACE WATER SUPPLY.

SNOW WAS BELOW NORMAL DURING THE WINTER MONTHS IN ARIZONA. STORED WATER IS WELL ABOVE AVERAGE ON THE SALT RIVER BUT POOR ON THE GILA. STORED WATER WILL SUPPLY A MAJOR SEGMENT OF 1959 SURFACE WATER SUPPLIES.

COLORADO. Snow pack to May 1 on the Platte and Arkansas drainage is generally normal or better with some deficiency along the Sangre de Cristo range of the Arkansas watershed. Carryover storage is above average, particularly in larger reservoirs of the Colorado-Big Thompson system, the Denver Municipal supply and in John Martin. Soil moisture conditions in irrigated areas are good. Irrigation water is expected to be reasonably adequate, but in total somewhat less than for 1957 and 1958.

Stream flow on the Yampa, White and Upper Colorado rivers will be slightly less than average but no shortage along the main streams is expected. There will be late season shortage on the Gunnison for areas of limited reservoir storage. The deficiency of snowfall during the winter months was continued on the Rio Grande, San Juan, and Dolores watersheds. Snow measurements are all among the lowest of record for this date. Soils are dry in both mountain and irrigated areas. Severe water shortages are indicated for the heavy demand of the Rio Grande and Dolores.

NEW MEXICO. The flow of the Rio Grande through New Mexico is now expected to be near one-third of normal or among the lowest of record. Snow pack in Northern New Mexico is extremely deficient and mountain soils remain generally dry. Water supply outlook below Elephant Butte is improved with about 1,025,000 acre-feet stored in Elephant Butte and Caballo Reservoirs but inflow will probably be negligible from snow melt. The water supply outlook for the Tucumcari Project on the Canadian River and the Carlsbad Project on the Pecos River is good because of well above normal carryover storage.

ARIZONA. The winter season was unusually dry in the mountains. Stream flow will be low but carryover storage will provide average surface water supplies for the Salt River Project. An extreme shortage is again in evidence for the Gila River irrigated area.

UTAH. Colorado River tributaries in Utah have very poor stream flow prospects in 1959. Forecasts are in the range of 50 percent of normal, comparable to Southwestern Colorado. Very little contribution will be made to the Colorado River.

COOPERATIVE SNOW SURVEYS
SUMMARY OF SNOW MEASUREMENTS
May 1, 1959

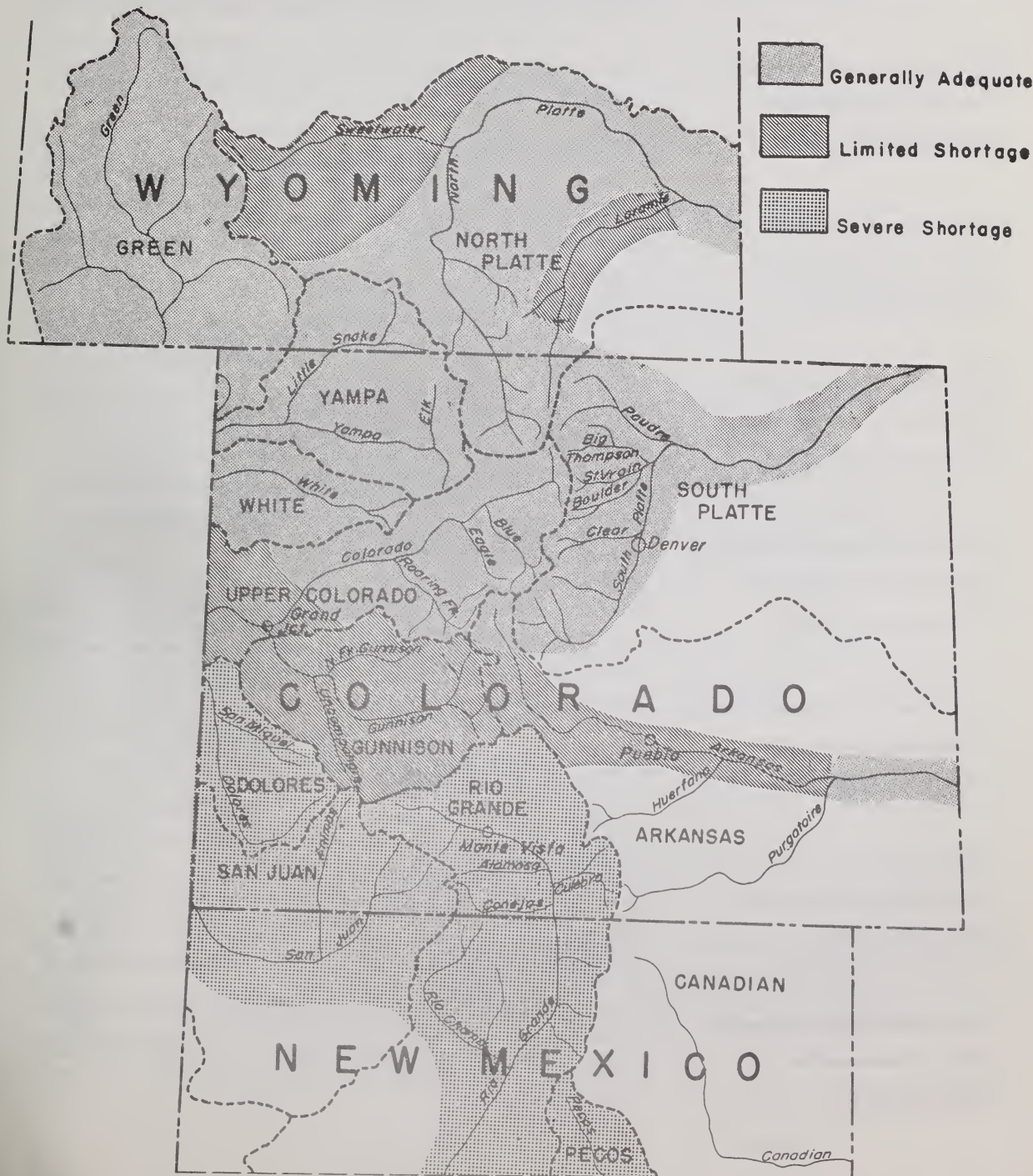
WATERSHEDS	No. of Courses Averaged	Years of Record	Water Content as percent of 1958	Avg.	WATERSHEDS	No. of Courses Averaged	Years of Record	Water Content as percent of 1958	Avg.
ARKANSAS RIVER					PLATTE RIVER				
Arkansas River	8	10-23	76	97	Sweetwater				
COLORADO RIVER					North Platte River	13	8-23	86	109
Colorado River*	26	8-23	88	113	Laramie River	9	10-23	101	122
Roaring Fork	3	22-23	83	100	South Platte River**	3	10-23	99	138
Plateau Creek	2	19-22	57	75	Poudre River	8	7-23	90	118
Yampa River	6	8-23	86	121	Big Thompson River	4	8-21	95	103
White River	2	23	67	104	St. Vrain River	3	9-23	85	87
Gunnison River	11	7-23	61	83	Boulder Creek	2	9-20	110	146
Dolores River	4	10-23	46	83	Clear Creek	5	8-23	97	123
Green River (Wyo.)	5	20-23	93	109	RIO GRANDE				
San Juan River	4	8-23	55	57	Rio Grande (Colo.)	9	8-23	52	69
Animas River	8	8-23	44	69	Rio Grande (N. M.)	--	--	--	--
					Conejos River	3	10-23	37	44
					Alamosa River	2	10-22	49	38

*Above Glenwood Springs

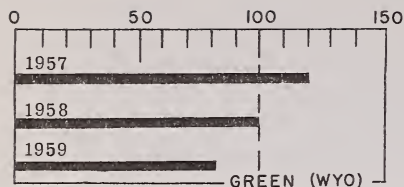
**Above Denver

WATER SUPPLY OUTLOOK

THE MAP ON THIS PAGE INDICATES THE MOST PROBABLE WATER SUPPLY AS OF THE DATE OF THIS REPORT. ESTIMATES ASSUME AVERAGE CONDITIONS OF SNOW FALL, PRECIPITATION AND OTHER FACTORS DURING THE SPRING AND EARLY SUMMER MONTHS. AS THE SEASON PROGRESSES ACCURACY OF ESTIMATES IMPROVE. IN ADDITION TO EXPECTED STREAM-FLOW, RESERVOIR STORAGE, SOIL MOISTURE IN IRRIGATED AREAS, AND OTHER FACTORS ARE CONSIDERED IN ESTIMATING WATER SUPPLY. ESTIMATES APPLY TO IRRIGATED AREAS ALONG THE MAIN STREAMS AND MAY NOT INDICATE CONDITIONS ON SMALL TRIBUTARIES.

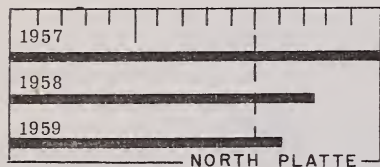


WATER SUPPLY OUTLOOK

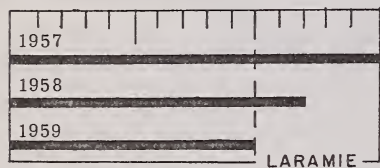


THE BAR CHARTS ON THIS AND THE NEXT PAGE REPRESENT GRAPHICALLY THE MOST PROBABLE WATER SUPPLY OUTLOOK FOR 1959 AS COMPARED TO 1957 AND 1958. STREAMFLOW AND OTHER FACTORS FOR 1958 ARE PARTIALLY ESTIMATED AS FULL DATA ON WATER SUPPLY CONDITIONS ARE NOT YET AVAILABLE. ESTIMATES OF PAST CONDITIONS AND FORECASTS HAVE BEEN MADE BY THE AUTHORS OF THIS REPORT IN CONSULTATION WITH WATER OFFICIALS.

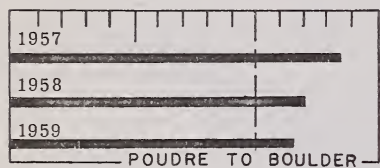
GREEN: The flow of the Green River in Wyoming will be less than average in 1959 but should be adequate to meet local needs. Snow pack near the headwaters in Wyoming is relatively heavier than near the Utah-Wyoming border.



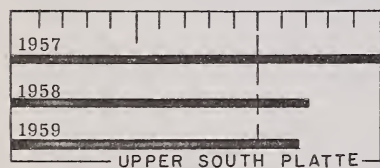
NORTH PLATTE: Water supply on the North Platte will meet irrigation water demands for 1959. Inflow to Seminoe Reservoir will be slightly less than May. Storage in major reservoirs in Wyoming, including the new Glendo reservoir, is 1,450,000 acre feet with 500,000 assigned to the North Platte project, which is nearly twice normal and a little less than for a year ago. Soil moisture conditions in valley areas are good.



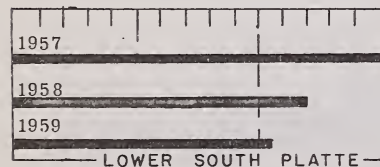
LARAMIE: Snow cover on the headwaters of the Laramie River is near normal and similar to a year ago. Soil moisture conditions in the valley area are good. Summer stream flow is expected to be about normal. Reservoir storage is about one-third of that available a year ago totaling about 15,000 acre-feet in Wheatland reservoirs.



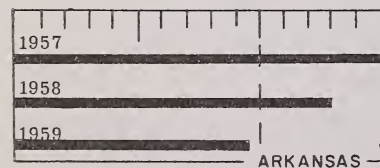
POUDRE-BOULDER: Water supply from natural sources on the Poudre, Big Thompson and St. Vrain Rivers and Boulder Creeks will be near normal for 1959. Mountain snow pack ranges from normal to 130 percent of normal, with a small area on Boulder Creek at about 140 percent of normal. Storage in smaller irrigation reservoirs is near average and somewhat less than for a year ago. In addition to natural stream flow, there is a total of about 200,000 acre-feet in Horsetooth and Carter Lakes and about 230,000 acre feet in Granby for the Colorado-Big Thompson project.



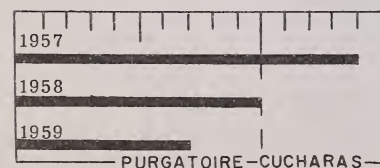
UPPER SOUTH PLATTE: Early season snow and soil moisture measurements indicate that the summer flow of the Upper South Platte and Clear Creek will be slightly above average. Municipal reservoirs of the of Denver may be expected to fill again this year. Storage in irrigation reservoirs is a little less than for a year ago but above normal.



LOWER SOUTH PLATTE: The water supply outlook for the lower South Platte is good. Winter streamflow is above normal and larger reservoirs are expected to fill again this year. Summer stream flow will probably be near average but this is largely dependent on rainfall and irrigation water demands on the tributaries during the irrigation season.



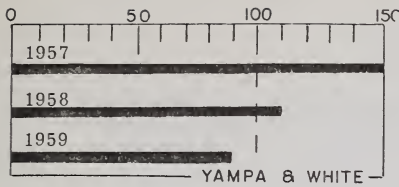
ARKANSAS: Seasonal snowfall has been near normal at Tennessee Pass and Fremont Pass with about 80 percent normal snowfall near Monarch Pass and along the Sangre de Cristo range to the south. Mountain soils are dry. Except for Twin Lakes, storage is better than average but not as good as for 1958. Soil moisture conditions are good for the lower valley. The general water supply outlook for the irrigated area above John Martin Reservoir is near average. With near 250,000 acre-feet stored in John Martin Reservoir, the outlook for irrigation water below the reservoir is excellent.



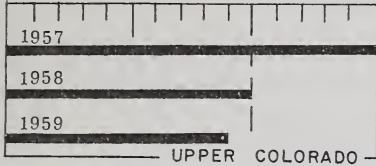
PURGATOIRE-CUCHARAS: The flow of the Huerfano, Cucharas and Purgatoire Rivers will be in the range of 50 to 70 percent of normal based on present snow measurements. Soil moisture conditions in valley areas are good. Much of the water supply outlook depends on later precipitation.

Average

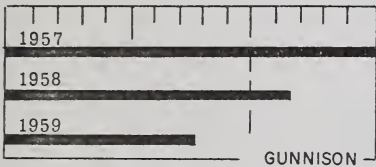
WATER SUPPLY OUTLOOK



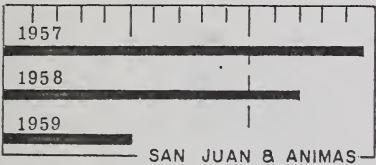
YAMPA-WHITE: Snow pack is slightly above normal on the headwaters of the Yampa River and the White River. Soil moisture conditions in valley areas are fair. Mountain soils are dry. Water supply is expected to be adequate to meet demands on these streams this year.



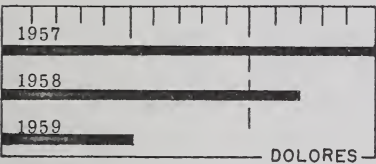
UPPER COLORADO: Snow pack is above normal for this date on the Colorado River and Roaring Fork above Glenwood Springs. Summer stream flow is expected to be slightly less than normal. There may be late season shortage along small tributaries where there is no storage. Soil moisture conditions are only fair reflecting the summer and fall drouth.



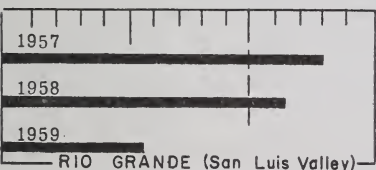
GUNNISON: Snow pack is now about 80 percent of normal on mountains surrounding the drainage. There will be some water shortage on smaller tributaries in late season. Soil moisture conditions in irrigated areas are reported as good. Storage in Taylor Park Reservoir is below normal and 65 percent of a year ago but should fill with spring runoff.



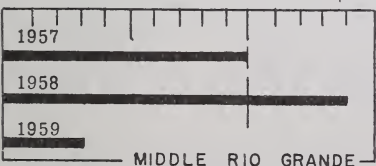
SAN JUAN-ANIMAS: The snow pack on these watersheds declined sharply during March and is now less than one-half of normal. Mountain soils are relatively dry although some wetting from snow melt has occurred. Summer runoff is forecast at about one-half of normal. Some shortage may be expected for heavy demand areas on the Pine and Florida and other smaller tributaries. Storage in Vallecito is 47,000 acre-feet which is near average but two-thirds of that stored a year ago.



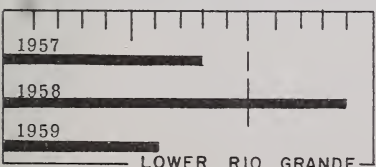
DOLORES: Water supply outlook for the Dolores also declined during March. Snow pack is about 40 percent of normal. Stream flow is forecast at about 50 percent of normal. A severe shortage of water is in evidence for the Montezuma irrigated area.



RIO GRANDE-SAN LUIS VALLEY: Water supply outlook for the San Luis Valley is poor in contrast to the 1957 and 1958 water years. Snow pack is about one-half of normal with many courses at a minimum of record for May 1. The shortage may not be quite as severe as in the 1954-56 years because of improved groundwater levels. Storage is less than half of that available last year. Valley soil moisture conditions are reported as fair to poor.



MIDDLE RIO GRANDE (New Mexico): The deficiency of snowfall during the winter in Southern Colorado extended into Northern New Mexico. Mountain soils are dry. Storage is less than normal. The water supply outlook through the middle Rio Grande Valley and for the small tributaries in Northern New Mexico is poor.



LOWER RIO GRANDE: Storage in Elephant Butte and Caballo Reservoirs totals about 1,025,000 acre-feet which is about normal and greater than for any recent year. Inflow will be negligible and surface water shortage is definitely indicated. Soils in the irrigated area are dry.

Water supply outlook is good for the Tucumcari Project on the Canadian River and for the Carlsbad Project on the Pecos River. Stream flow will be below normal but carryover storage is above normal and a year ago.

FOR DETAILS ON WATER SUPPLY CONDITIONS ON THE COLORADO RIVER DRAINAGE IN UTAH AND ARIZONA, NOT LISTED OR DISCUSSED IN THIS REPORT, REFERENCE SHOULD BE MADE TO THE STATE SNOW REPORTS FOR UTAH AND ARIZONA (see inside cover).

Average

STREAMFLOW FORECASTS

APRIL-SEPTEMBER INCLUSIVE

May 1, 1959

"The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature during the forecast period will be near average. Appreciable deviations from normal of temperature and/or precipitation during the forecast period will correspondingly modify these forecasts."

BASIN AND STREAM	15-Yr.			BASIN AND STREAM	15-Yr.		
	Forecast 1000 AF	%Avg. 1938-52	Avg. 1938-52		Forecast 1000 AF	%Avg. 1938-52	Avg. 1938-52
NORTH PLATTE				COLORADO			
Sweetwater at Alcova			73	Gunnison at Gr. Junction	1025	68	1510
North Platte at Saratoga	550	84	657	San Juan at Rosa, N. M.	350	50	703
Medicine Bow near Hanna			111	Piedra at Piedra	105	49	215
Laramie at Jelm	100	95	105	Los Pinos nr Bayfield (7)	130	57	228
				Florida nr Durango	35	51	69
SOUTH PLATTE				Animas at Durango	325	62	522
Cache La Poudre at Canon (1)	245	111	220	La Plata at Hesperus	16	53	30
Big Thompson at Drake	105	95	111	Dolores at Dolores	180	58	314
Saint Vrain at Lyons	90	102	88	Colorado nr Grand			
Boulder at Orodell	70	127	55	Canyon, Arizona	7100	71	10,069
Clear Creek at Golden (2)	160	113	141				
ARKANSAS				GREEN RIVER			
Arkansas at Salida (3)	290	90	323	Green at Linwood, Utah	1000	77	1302
Arkansas at Pueblo (3)	315	79	401	Little Snake at Lily	275	75	365
Cucharas at La Veta	10	63	16	Elk at Clark	200	93	214
Purgatoire at Trinidad	25	44	57	Yampa at Steamboat Spgs.	275	98	281
				White at Meeker	315	94	336
COLORADO				RIO GRANDE			
Colorado nr Granby (4)	235	102	231	South Fork at South Fork	70	53	132
Willow nr Granby	35	81	43	Rio Grande at Del Norte (8)	290	51	565
Blue abv Green Mt. Res.	275	90	307	Alamosa above Terrace Res.	40	52	78
Colorado at Glenwood Spgs(5)	1475	96	1540	Conejos at Mogote	120	54	220
Roaring Fork at Glenwood (6)	675	87	777	Culebra at San Luis (9)	15	50	30
Plateau Creek at Collbran	36	58	62	Rio Chama nr La Puente	115	43	265
Uncompahgre at Colona	115	65	170	Costilla at Costilla	15	44	34
Surface Cr. nr Cedaredge	12	67	18	Rio Grande at Otowi Bridge (10)	300	35	851
				Rio Grande at San Marcial (10)	100	16	619
				Pecos at Pecos	20	32	62

(1) Observed flow minus diversions from Michigan, Colorado and Laramie Rivers, plus diversions for irrigation and municipal use.

(2) Observed flow minus diversions through Jones Pass Tunnel.

(3) Observed flow plus change in storage in Clear Creek, Twin Lakes and Sugar Loaf Reservoir's minus diversions through Busk-Ivanhoe and Twin Lake Tunnels and Ewing, Fremont Pass, Wurtz and Columbine Ditches.

(4) Observed flow plus diversions by Adams tunnel and Grand River ditch plus change in storage in Granby Reservoir.

(5) Observed flow plus the changes as indicated in (4) plus Moffat Ditch.

(6) Observed flow plus diversion through Twin Lakes tunnel.

(7) Observed flow plus changes in Vallecito Reservoir.

(8) Observed flow plus change in storage in Santa Maria, Rio Grande, and Continental Reservoir.

(9) Observed flow plus changes in storage in Sanchez Reservoir.

(10) Observed flow plus changes in storage in Santa Maria, Rio Grande, Continental, Terrace, Sanchez, Platoro and El Vado Reservoirs.

May 1, 1959

RESERVOIR	USABLE CAPACITY 1000 A. F.	USABLE STORAGE 1000 A. F.			15-yr. Avg. 1938-52	RESERVOIR	USABLE CAPACITY 1000 A. F.	USABLE STORAGE 1000 A. F.			15-yr. Avg. 1938-52
		1959	1958	1938-52				1959	1958	1938-52	
NORTH PLATTE DRAINAGE						ARKANSAS DRAINAGE					
Kingsley	1900.0	1579.0	1164.0	1219.5*	Twin Lakes	57.9	14.3	39.8	21.4		
Sutherland	70.0	42.4	45.5	47.7	Sugar Loaf	17.4	2.6	15.6	8.0		
Minatare	58.8	49.2	47.8	41.0	Clear Creek	11.4	5.1	9.4	4.2		
Alcova	190.3	188.3	186.8	132.2	Meredith	41.9	23.5	28.3	17.1		
Seminole	1011.6	536.5	548.9	338.5*	Horse Creek	26.9	2.6	22.5	9.2		
Guernsey	44.8	33.1	31.3	36.3	Adobe Creek	61.6	27.9	57.4	25.7		
Pathfinder	1015.9	203.7	721.3	493.4	Cucharas	40.0	5.8	16.6	5.9		
Kortes	4.7	4.6	--	--	John Martin	655.0	237.7	282.0	67.2*		
SOUTH PLATTE DRAINAGE						Great Plains	150.0	108.3	117.5	55.2	
Windsor	18.6	15.6	14.3	12.9	Model	15.0	5.0	5.1	4.2		
Cache la Poudre	9.5	9.9	8.4	7.9	Conchas (NM)	600.0	241.0	211.0	272.8		
Fossil Creek	11.6	8.8	9.8	8.6	WCAustin	151.0		96.2	--		
Terry Lake	8.2	5.5	5.8	5.1	COLORADO DRAINAGE						
Halligan	6.4	6.4	4.9	2.2	Taylor Park	106.2	51.1	76.5	70.6		
Chambers Lake	8.8	2.1	3.6	3.1	Vallecito	126.3	51.4	70.7	42.9*		
Cobb Lake	34.3	17.9	18.8	4.6	Groundhog	21.7	6.1	19.0	11.4		
Black Hollow	8.0	5.0	3.7	3.3	Granby	465.6	231.7	281.0	139.6*		
Carter	108.9	83.0	100.2	--*	Green Mountain	146.9	42.6	46.4	55.1		
Horsetooth	143.5	117.5	133.2	--*	Lake Mead	27,207.0	20,230.0	19,223.0	18,687.0		
Lake Loveland	14.3	11.8	12.1	6.1	Lake Havasu	688.0	605.4	641.5	571.3*		
Boyd Lake	44.0	40.6	42.2	16.8	Lake Mohave	1,810.3	1,651.2	1,779.0	--		
Lone Tree	9.2	8.8	8.4	8.3	RIO GRANDE (COLO) DRAINAGE						
Mariano	5.4	5.6	5.6	3.3	Rio Grande	51.1	8.8	40.0	16.5		
Union	12.7		12.4	7.5	Santa Maria	43.6	8.3	15.4	11.0		
Eleven Mile	81.9	97.8	97.6	75.8	Sanchez	103.2	24.6	33.5	15.4		
Cheesman	79.0	67.4	79.1	60.4	Terrace	17.7	3.8	--	4.7		
Marston	18.9	16.9	16.6	15.8	Continental	26.7	5.6	15.3	8.9		
Antero	33.0	15.7	15.7	15.2	Platoro	60.0	34.0	30.4	--*		
Gross	43.1	12.7	30.7	--*	RIO GRANDE (N. M.) DRAINAGE						
Barr Lake	32.2	27.7	28.4	23.9	Elephant Butte	2,273.7	851.7	754.8	870.3		
Milton	24.4	16.7	16.3	14.4	Caballo	365.0	172.6	137.4	142.1		
Standley	18.5	12.2	16.5	14.0	El Vado	225.0		82.2	104.1		
Marshall	10.3	5.5	8.0	4.8	Alamogordo	128.0	122.0	127.0	46.2		
Horse Creek	20.6	13.8	14.5	10.3	McMillan-Avalon	37.0	18.0	27.0	12.0		
Riverside	57.5	57.5	57.8	50.1	Red Bluff(Tex)	307.0		27.2	--		
Empire	37.7	33.6	34.5	31.1	SALT AND GILA DRAINAGE						
Jackson Lake	35.4	34.3	34.3	34.4	Roosevelt	1,382.0	379.9	490.5	566.3		
Prewitt	32.8	29.1	29.5	23.9	Horse Mesa	245.1	217.4	235.9	207.1		
Point of Rocks	70.0	70.3	70.6	61.2	Mormon Flat	58.0	53.9	56.0	48.6		
Julesburg	28.2	22.2	22.3	22.3	Saguaro	70.0	66.2	56.0	50.5		
						Bartlett	180.0	66.5	164.1	85.1*	
						Horseshoe	143.0	31.3	70.5	31.0*	
						Carl Pleasant	163.8	17.8	24.3	35.7	
						San Carlos	1,205.0	58.4	228.4	198.6	

* Shorter Periods

VALLEY PRECIPITATION^{1/}

Division Averages and Departures^{3/}

May 1, 1959

DRAINAGE DIVISIONS	Fall		Winter		2/	DRAINAGE DIVISIONS	Fall		Winter		2/
	Sept. Avg.	-Oct. Dept.	-Nov. Avg.	Dec. Dept.			Sept. Avg.	-Oct. Dept.	-Nov. Avg.	Dec. Dept.	
North Platte River, Wyo.	1.27	-1.47	3.17	- .41		Colorado River, Ariz.	--	--	--	--	
South Platte River	2.08	- .84	3.88	+1.18		Gila River, N. M.	7.18	+3.19	.96	-2.59	
Arkansas River	1.97	- .82	3.45	+ .18		Canadian River, N.M.	2.55	-1.32	1.56	-1.05	
Colorado River	3.32	- .90	4.60	-1.70		Rio Grande, Colo.	2.23	- .57	1.72	- .36	
Green River, Wyo.	1.45	-1.07	1.98	- .16		Rio Grande, (N), N.M.	4.11	+ .43	1.89	-2.31	
San Juan River, N.M.	3.40	+ .57	1.21	-2.10		Rio Grande (S), N.M.	4.46	-2.01	.56	-1.19	
						Pecos River, N.M.	4.47	-1.53	.75	-1.87	

1/ Preliminary analysis by U.S. Weather Bureau from data furnished by Meteorological Service & U. S. Weather Bureau

2/ Departure from average

3/ Selected Stations

AVAILABLE SOIL MOISTURE IN INCHES*

May 1, 1959

DRAINAGE BASIN AND STATION	Profile Depth	Soil Moisture Content in Inches				DRAINAGE BASIN AND STATION	Profile Depth	Soil Moisture Content in Inches			
		Cap. In.	1959 In.	1958 In.	1957 In.			Cap. In.	1959 In.	1958 In.	1957 In.
NORTH PLATTE						UPPER COLORADO					
Columbine Lodge	48	8.0	7.3	6.8	0.7	Vail Pass	48	8.0	--	--	--
Willow Creek	"	7.0	2.1	7.0	1.0	Ranch Creek	"	7.0	4.2	3.8	3.3
Windy Point	"					Hairpin	"	8.0	0.1	4.2	0.0
Barrett	"					Vasquez	"	7.0	6.2	5.3	5.5
						Gore Pass	"	7.0	7.0	6.5	5.9
						Blue River	"	7.0	1.4	5.9	0.3
SOUTH PLATTE											
Red Feather	"	6.0	1.6	3.2	2.9	GUNNISON					
Chambers Lake	"	7.0	2.5	2.9	1.7	Monarch Pass	"	8.0	6.3	7.1	5.6
Deer Ridge	"	6.0	0.2	1.3	0.7						
Hidden Valley	"	8.0	1.7	4.1	2.9	RIO GRANDE (Colo.)					
Longs Peak	"	7.0	2.4	2.3	2.8	Bristol View	"	7.0	--	--	--
University Camp	"	7.0	0.6	1.7	0.8	Wolf Creek Pass	"	9.0	4.6	6.7	2.5
Berthoud Falls	"	6.0	2.3	1.8	0.3	River Springs	"	7.0	6.3	6.4	6.5
Alma	"	7.0	0.5	4.1	0.6	La Veta Pass	"	8.0	5.7	7.3	7.3
Kenosha Pass	"	7.0	6.4	6.6	1.4						
						RIO GRANDE (N.M.)					
ARKANSAS						Red River*	"	7.0	0.2	3.6	0.4
Leadville	"	7.0	1.9	3.9	3.9	Tres Ritos*	"	7.0	1.0	6.4	3.9
Lake Creek	"	6.0	4.2	5.2	5.4	Bateman *	"	8.0	1.0	7.7	7.4
Garfield	"	7.0	5.2	6.0	6.0	Chamita *	"	8.0	2.5	7.3	7.5
ROARING FORK											
Placita	"	8.0	5.1	--	--						
Maroon	"	8.0	8.0	7.4	5.8						

*April 1

SNOW COURSE MEASUREMENTS

May 1, 1959

SNOW COURSE	Depth 1959		Water Content in Inches		Years of Record		SNOW COURSE	Depth 1959		Water Content in Inches		Years of Record	
	Date	Inches	1959	1958	Avg.	Record		Date	Inches	1959	1958	Avg.	Record
**													
PLATTE RIVER DRAINAGE													
SWEETWATER RIVER													
Grannier Meadows				11.0	14.0	22							
South Pass*				11.4	14.6	19							
Larsen Creek	4/27	25	6.3	9.1	8.2	9							
NO. PLATTE RIVER													
Cameron Pass	5/1	72	29.7	32.9	24.3	23							
Park View	4/30	17	5.3	7.2	7.9	23							
Columbine Lodge	4/30	53	28.1	28.3	20.6	23							
Willow Cr. Pass*	4/30	30	9.9	11.8	13.5	21							
Northgate	5/1	8	2.7	3.6	--	9							
Bottle Creek	4/25	25	9.7	11.9	9.2	22							
Webber Spring	4/29	35	14.1	17.3	16.4	23							
Old Battle	4/29	74	29.5	35.5	34.0	23							
N. French Creek	4/30	87	36.9	42.9	32.7	21							
N. Barrett Creek	4/30	54	21.2	27.8	22.2	23							
Ryan Park	4/30	19	6.9	13.5	7.9	23							
Spring Creek			DROPPED										
Albany*	4/24	43	15.6	14.1	11.6	10							
LaBonte	4/29	0	0	0	0.0	8							
Boxelder	4/30	16	6.5	4.4	5.1	9							
LARAMIE RIVER													
Roach	5/1	55	19.3	20.5	21.1	18							
Deadman Hill*	4/29	55	18.6	19.5	17.6	20							
McIntyre	5/1	35	10.8	12.2	8.9	10							
Brooklyn Lake	4/23	70	27.6	26.0	23.6	23							
Fox Park	4/28	21	8.0	13.4	5.5	23							
Pole Mtn.*	4/24	18	5.2	2.9	2.5	17							
Libby Lodge	4/23	36	13.2	9.8	6.8	23							
Hairpin Turn	4/23	40	13.5	11.7	11.4	23							
Albany	4/24	43	15.6	14.1	10.6	10							
POUDRE RIVER													
Cameron Pass	5/1	72	29.7	32.9	24.3	23							
Chambers Lake	5/3	17	8.1	11.0	4.4	23							
Big South	5/3	1	.4	2.2	0.7	23							
Deadman Hill	4/29	55	18.6	19.5	17.6	20							
Lake Irene*	4/30	62	23.4	27.0	24.5	21							
Hour Glass Lake	4/30	24	7.4	9.2	8.2	19							
Red Feather	4/29	23	9.1	7.1	4.1	10							
Lost Lake	5/3	31	14.2	12.9	9.0	7							
BIG THOMPSON RIVER													
Lake Irene*	4/30	62	23.4	27.0	24.5	21							
Hidden Valley	4/28	47	14.2	13.0	13.8	18							
Deer Ridge	4/28	20	5.1	3.9	4.1	10							
Longs Peak	5/1	40	13.9	15.6	12.5	8							
Two-Mile	4/28	60	18.1	17.7	--	7							
T. VRAIN RIVER													
Wild Basin	5/3	41	14.4	14.3	14.9	23							
Copeland Lake	5/3	2	0.5	5.3	6.3	10							
Ward	5/1	24	8.6	7.9	5.8	9							
BOULDER CREEK													
University Camp	4/28	81	31.6	26.6	23.7	20							
Toffat	4/30	33	15.5	16.1	8.5	9							
Boulder Falls	4/28	49	22.9	13.1	--	6							
PLATTE RIVER DRAINAGE													
CLEAR CREEK													
Loveland Pass	4/29	53	20.1	19.1	16.0	23							
Grizzly Peak*	4/29	60	21.2	23.2	20.3	17							
Empire	5/1	26	7.3	10.2	6.3	10							
Berthoud Falls	5/1	43	19.1	17.9	12.4	8							
Clear Creek	5/1	59	21.2	21.3	17.0	8							
SOUTH PLATTE RIVER													
Hoosier Pass	5/1	43	15.8	17.0	12.0	23							
Jefferson Cr.	5/1	27	9.9	10.6	7.5	19							
Geneva Park	4/30	9	3.6	2.1	1.7	10							
ARKANSAS RIVER DRAINAGE													
ARKANSAS RIVER													
Tennessee Pass	4/28	35	11.9	13.0	6.8	23							
Twin Lakes T.	4/30	25	8.3	12.4	9.5	22							
La Veta Pass*	4/30	1	.8	2.2	4.1	23							
4 Mile Park	4/29	4	1.4	2.5	0.4	21							
Fremont Pass	4/30	53	17.7	21.5	18.7	23							
Blue Lakes		NS	NS	NS	7.0	21							
Monarch Pass	4/29	50	18.2	22.1	19.3	18							
Saint Elmo (a)	4/30	33	10.2	10.0	10.6	9							
Timberline	5/1	72	18.8	31.5	20.5	10							
East Fork	4/29	32	10.0	11.2	--	7							
Westcliffe	4/30	0	0.0	1.7	--	6							
Bourbon	5/1	0	0.0	3.5	--	3							
COLORADO RIVER DRAINAGE													
COLORADO RIVER (Above Glenwood Springs)													
Cameron Pass*	5/1	72	29.7	32.9	24.3	23							
Phantom Valley	5/1	19	5.5	10.7	6.8	23							
Hoosier Pass*	5/1	43	15.8	17.1	12.0	23							
Berthoud Pass	4/30	46	18.1	22.0	15.8	23							
Tennessee Pass	4/28	35	11.9	13.0	6.8	23							
M. Fork Camp Gr.	4/29	22	8.2	10.4	6.6	23							
Fiddler Gulch	4/30	52	19.5	20.3	16.2	21							
Lulu	5/1	51	19.1	22.5	20.0	19							
Willow Creek P.	4/30	30	9.9	11.8	13.5	21							
N. Inlet Grand L.	4/29	24	6.7	8.2	7.8	21							
Lake Irene	4/30	62	23.4	27.0	24.5	21							
Arrow	4/29	32	12.2	13.3	7.8	21							
Lapland	5/1	25	10.3	11.0	9.0	21							
Fremont Pass	4/30	53	17.7	21.5	18.7	23							
Lynx Pass	5/1	23	10.0	11.1	8.5	23							
Shrine Pass	4/30	56	21.5	24.1	18.9	17							
Grizzly Peak	4/29	60	21.2	23.2	20.3	17							
Glen-Mar Ranch	4/29	19	6.6	9.2	6.6	12							
Monarch Lake	5/1	21	6.5	5.9	5.9	11							
Granby	4/30	12	5.0	5.0	2.4	10							
Grand Lake	5/1	12	3.1	0.0	3.9	10							
Berthoud Summit	5/1	66	23.6	27.4	18.2	8							
Frazer View	5/1	41	15.1	17.3	11.1	8							
Gore Pass	5/1	24	9.9	8.7	7.3	8							
Frisco	4/29	21	7.0	10.3	5.7	8							
Snake River	4/29	20	6.1	8.1	5.7	8							
Summit Ranch	4/29	21	6.5	6.5	6.1	8							
Vail Pass	4/30	43	15.7	22.6	--	7							
Pando	4/30	31	10.5	12.9	--	7							
Kokomo	4/29	38	11.5	14.4	--	7							
Milner	4/30	35	12.4	16.4	--	7							
Blue River	5/1	28	10.9	12.5	--	2							
Jones Pass	4/30	45	16.4	19.2	--	2							
Ranch Creek	4/29	29	10.5	10.2	--	2							
Vasquez Creek	4/29	41	15.6	14.1	--	2							

On adjacent drainage

Average for courses with less than 15 years of record during the period 1938-52 are partially estimated.

No Survey

a) Air observed

* On adjacent drainage

** Average for courses with less than 15 years of record during the period 1938-52 are partially estimated.

NS No Survey

(a) Air observed

SNOW COURSE MEASUREMENTS

May 1, 1959

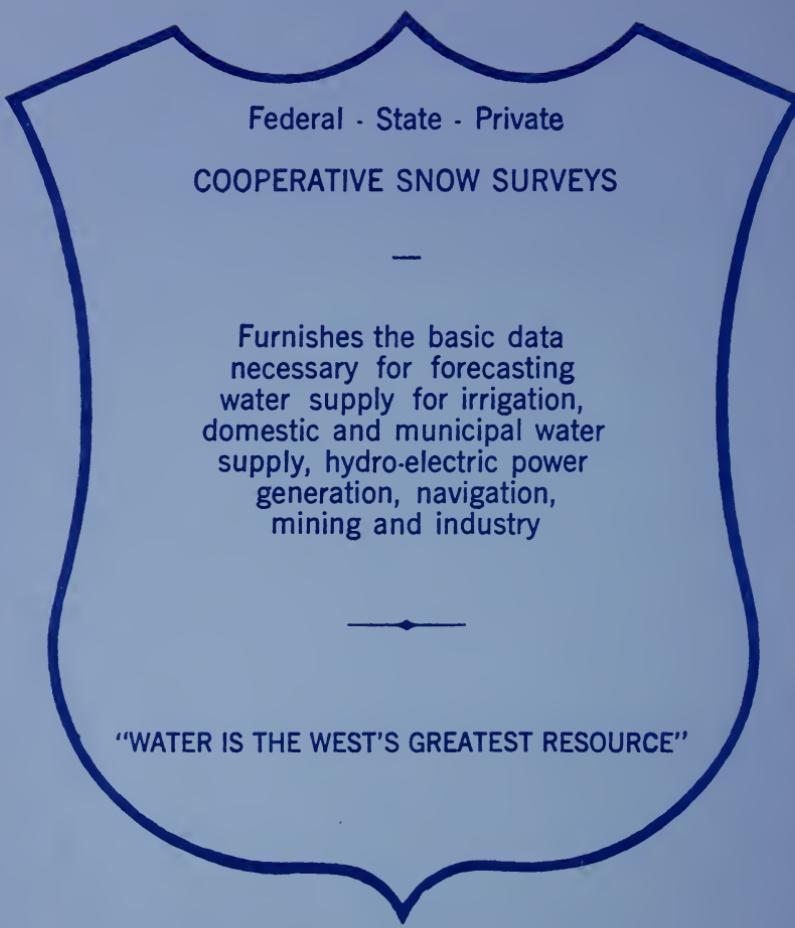
SNOW COURSE	Date	Depth	Water Content		Years of Record	
		1959 Inches	1959 1958 Inches	Avg.		
COLORADO RIVER DRAINAGE						
ROARING FORK						
Ind. Pass Tunnel	5/1	47	18.3	21.1	17.9	23
North Lost Trail	4/30	22	9.7	12.2	10.3	23
Nast	4/30	6	1.6	2.5	1.4	22
Ivanhoe				18.6	19.1	13
Lift		NS	NS	--	--	
YAMPA RIVER						
Dry Lake	4/28	49	20.7	29.1	15.8	23
Columbine Lodge*	4/30	63	28.1	28.3	20.6	23
Elk River	4/28	43	16.8	19.7	12.8	23
Lynx Pass*	5/1	23	10.0	11.1	8.5	23
Routt Line		NS	NS	NS	--	--
Rabbit Ears		NS	NS	NS	25.6	7
Yampa View	4/29	31	15.1	16.6	7.8	8
Flat Top		NS	NS	--	--	--
Bear River	4/29	28	10.8	11.6	--	3
Clark	4/28	12	4.7	7.3	--	3
Old Battle	4/29	74	29.5	35.5	33.7	23
WHITE RIVER						
Burro Mountain	4/30	41	17.0	23.2	15.2	23
Rio Blanco	5/1	21	9.7	16.9	10.4	23
PLATEAU CREEK						
Mesa Lakes	4/30	37	14.1	27.1	15.0	22
Trickle Divide	5/1	60	21.0	34.5	31.9	19
GUNNISON RIVER						
Crested Butte	4/29	22	8.8	11.3	7.3	23
Park Cone	4/29	18	6.1	8.7	5.8	22
Alexander Lake	5/1	42	14.1	31.2	24.4	22
Ironton Park	5/1	29	11.6	--	8.5	21
Trickle Divide	5/1	60	21.0	34.5	31.9	19
Park Reservoir	5/1	54	18.5	30.5	27.4	19
Porphyry Creek	4/29	48	17.7	21.9	17.9	19
Kannah Cr.		NS	NS	NS	--	--
Lake City	5/1	10	3.2	11.9	2.8	11
Spring Cr. Pass*		NS	NS	NS	--	--
Cochetopa Pass*	4/29	0	0.0	7.7	1.8	10
McClure Pass	4/30	23	9.8	13.7	9.5	9
Red Mt. Pass	5/1	76	30.7	42.2	32.8	7
Blue Mesa	5/1	1	.4	NS	--	--
SAN JUAN RIVER						
Wolf Creek Pas s*	4/29	35	15.9	26.4	28.2	23
Upper San Juan	5/1	43	18.3	34.0	32.8	23
Granite Peaks	4/30	0	0.0	0.0	0.8	19
La Plata		NS	NS	NS	--	9
Wolf Creek Summit	4/29	55	19.4	36.6	33.0	8
Chama Divide*	5/1	0	0.0	0.0	--	--
Chamita*	5/1	0	0.0	3.7	--	2

SNOW COURSE	Date	Depth	Water Content		Years of Record	
		1959 Inches	1959 1958 Inches	Avg.		
COLORADO RIVER DRAINAGE						
ANIMAS RIVER						
Silverton Sub. S.	5/1	0	0.0	--	1.0	21
Ironton Park*	5/1	29	11.6	--	8.5	22
Cascade	5/1	0	0.0	10.5	3.5	23
Spud Mt.	5.1	36	13.4	35.8	28.4	8
Molas Lake	5/1	4	1.5	17.5	11.6	8
Howardville	5/1	21	6.2	14.8	6.9	8
Mineral Creek	5/1	32	11.4	22.6	16.2	8
Red Mt. Pass*	5/1	76	30.7	42.2	32.8	8
DOLORES RIVER						
Rico	5/1	0	0.0	0.0	1.4	22
Telluride	5/1	0	0.0	3.7	1.3	23
Lizard Head	5/1	27	11.8	23.4	15.9	22
Trout Lake	5/1	20	9.3	18.5	6.8	10
GREEN RIVER (WYOMING)						
Dutch Joe	4/28	14	5.2	6.0	4.4	20
Mulligan Park	5/3	25	6.5	9.5	6.5	23
Kendall R. S.	5/2	13	5.2	5.4	6.3	20
Loomis Park	5/2	31	13.2	11.0	11.8	20
Snyder Basin R. S.	4/29	27	11.2	12.7	--	4
Piney-LaBarge	4/29	37	16.0	17.5	13.2	22
RIO GRANDE DRAINAGE						
RIO GRANDE IN COLORADO						
Wolf Creek Pass	4/29	35	15.9	26.4	28.2	23
Upper Rio Grande	5/1	0	0.0	7.9	2.5	23
Santa Maria	5/1	0	0.0	2.0	1.1	20
Pool Table	4/29	0	0.0	5.2	1.2	10
L. Humphreys	4/29	0	0.0	0.8	0.1	10
Cochetopa Pass	4/29	0	0.0	7.7	1.8	10
Red Mt. Pass	5/1	76	30.7	42.2	32.8	8
Porcupine	4/29	23	7.0	11.4	5.3	8
Wolf Creek Summit	4/29	55	19.4	36.6	33.0	8
Hiway	4/29	46	17.0	29.2	--	2
Pass Creek	4/29	0	0.0	5.4	--	2
ALAMOSA RIVER						
Silver Lakes	4/28	0	0.0	1.8	1.1	22
Summitville	Est.	32	9.5	17.7	23.7	19
CONEJOS RIVER						
River Springs	4/30	0	0.0	1.1	1.0	22
Cumbres Pass	5/1	18	6.4	19.9	17.2	23
Platoro	4/28	16	5.9	12.5	9.5	10
West Conejos		NS	NS	2.9	4.4	10
La Manga		NS	NS	NS	14.2	10
SANGRE DE CRISTO RANGE (COLORADO)						
LaVeta Pass	4/30	1	.8	2.2	4.1	23
Culebra	5/1	4	1.0	10.1	9.7	19

* On adjacent drainage

**Average for courses with less than 15 years of record during the period 1938-52 are partially estimated.





Federal - State - Private
COOPERATIVE SNOW SURVEYS

Furnishes the basic data
necessary for forecasting
water supply for irrigation,
domestic and municipal water
supply, hydro-electric power
generation, navigation,
mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"